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Hard Drives in Your Car?

With PC and computer server markets maturing, disc drive makers are branching into promising new markets. As part of that trend, Seagate is in the fast lane to meet the needs of the emerging automotive market. With 60 million cars sold annually, this storage segment is healthy, stable and virtually untapped by hard disc manufacturers.

Hard discs in automobiles enable sophisticated navigation, entertainment and diagnostic capabilities. Market researcher IDC estimates that automotive hard drive use will soar from 520,000 units in 2003 to nearly 6 million units in 2008. A Seagate estimate puts hard disc penetration in new cars at about 50 percent within 10 years.

"Seagate is getting into the front end of this market," says Dan Good, Seagate vice president of advanced market concepts. "We're developing tight working relationships with automakers and their suppliers and engineering drives that meet their needs."

Organizational restructuring at Seagate has made it easier for the company to develop technology platforms that meet the needs of specific markets, according to Rob Pait, the company's director of global consumer storage marketing.

In Overdrive

Since launching its "Overdrive" project, an initiative to develop business between the company and automakers and their suppliers, Seagate has worked with the largest OEM automotive customers in the world and many of their top suppliers of audio, video and navigation solutions. These partnerships are helping Seagate understand the market dynamics and technical requirements needed to lead in the automotive industry.

Automotive HDD applications are emerging in three areas: navigation, entertainment and diagnostics. Navigation and entertainment will see the most growth in the next two-to-three years, according to Good. Diagnostic applications are expected to take off within three-to-five years.

Navigation is likely to be one of the first productized hard-drive applications for autos. A typical map database of the U.S. now fills six CD-ROMs, or one DVD, and map databases are growing daily with updated routes, points of interest and other storage-intensive information. Map graphics are expected to get even more complex, including three-dimensional, satellite-based data and animated imagery. These capabilities are rendering insufficient the CD-ROM and DVD storage used today.

Fortunately, hard drives meet the capacity requirements, and their read/write capability gives them another big advantage in an automobile connected to a network via GPS (global positioning system) or other means. With a hard disc, a car's navigation system can integrate real-time data, such as construction and traffic updates, on the fly.

Keep Your Eyes on the Road

Of course, a cutting-edge navigational system won't always keep you out of traffic. To pass the time, you'll need an on-board entertainment system powered by a Seagate hard drive. Today's audio and rear-seat entertainment options are only the beginning.

Many see satellite radio as a glimpse of what the future holds for car-based entertainment—and the thin end of the wedge for the network technology that will deliver it. "Real-time connectivity between a car and the network will change the automobile to the same degree that the Internet has changed computing and the cellular network has changed telephony," says Pait.

Interoperability and fair use issues will have to be resolved, but a car's entertainment system is likely to become an extension of a home-entertainment system. Drivers will be able to share music, video and other media between home and car, perhaps through a network or via a portable storage device that plugs into the dashboard. One automotive supplier already has a DVR-like radio in the works that digitizes content for playback at the user's discretion.

Electronics have made their way into many of a car's mechanical systems, and it's fairly common now for an automobile to be plugged into a diagnostic device when it's being serviced. Yet onboard chips and sensors are still relatively rudimentary, and the data they collect is fairly basic.

High-capacity onboard storage could bring automotive system diagnostics to a new level, according to Good. When sensor data can be stored centrally in a hard disc, troubleshooting becomes much more effective.

Detecting Problems Faster

"In our analysis, an automotive dealer said many warranty calls have to do with intermittent problems like engine trouble and sensor problems," says Good. "With a central repository for automobile computer and sensor data in the hard drive, sophisticated diagnostics at the service location can analyze the problem more readily."

Clearly, automobiles must deal with environmental conditions far more demanding than those a laptop faces, including temperature extremes and gradients, shock and vibration, and high-altitude conditions. For instance, a car-based hard disc must be able to endure a temperature range of -40 degrees C to 85 degrees C—a much more demanding specification than what's engineered into a typical hard drive for computers. That's because drivers don't stay put in one relatively stable environment. Hard drive suppliers must deliver products that can withstand the harsh extremes of the Arizona desert in summer or a bone-chilling Minnesota winter.

The perception of hard discs as fragile is quickly changing, however. Miniaturization is a key factor: a 1-inch drive is more resilient to shock and vibration than a 3.5-inch drive.

Manufacturers can also engineer their drives to run in "modified" mode in autos. In other words, a drive might not be fully operational at the most extreme conditions, but those conditions will not damage the drive and the data stored on it.

To supply hard drives as all these applications come online, Seagate is building on its close relationships with automakers and their suppliers, a market that is more specialized than Seagate's traditional customer base. And with this still-evolving market, Seagate is taking the long view.

"The automotive market grows slowly and steadily," says Good. "Product lifecycles are long, but it is a 'sticky' business. Relationships are loyal and long-term. Seagate's early work in this market could pay off big time."